

THE **BOEING** COMPANY
AERO-SPACE DIVISION
LAUNCH SYSTEMS BRANCH

DOCUMENT NO. T5-6539-76

VOLUME OF

TITLE Properties of 2219 Aluminum Alloy Stress Relieved Prior
To Aging

MODEL NO. Saturn V/S-10 CONTRACT NO. NAS-85608

ISSUE NO. M-12 ISSUED TO Scientific & Tech. Info. Soc.

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10-20-66

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10/28/66

REV. SYM.

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[illegible]

S-406-35-10 ORIG. 1/64

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REVISIONS			
REV. SYM.	DESCRIPTION	DATE	APPROVED

REV. SYM. _____

S-406-35-11 ORIG. 1/64

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ABSTRACT

Stress relieving of 2219-T37 aluminum alloy at 375°F for 3 hours after forming and prior to standard aging caused approximately a 5% loss in tensile properties when tested after standard aging.

KEY WORDS

2219 Aluminum Alloy
Stress Relief
Tensile Strength
Yield Strength
Elongation
Hardness

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1.0 OBJECT

The object of this program was to determine the degree of degradation of the tensile properties of 2219-T87 aluminum alloy when thermally stress relieved after solution treatment and prior to aging.

2.0 BACKGROUND

In planning the production of part number SK 60B12701, Manufacturing Engineering anticipated excessive distortion in machining 2219-T37 aluminum after severe forming and requested a thermal stress relief process to minimize the residual forming stresses prior to machining. The Materials and Processes unit, anticipating a mechanical property degradation due to thermal stress relief investigated this process to determine if this procedure would produce material with acceptable properties for this application.

3.0 CONCLUSIONS

The tensile strength, yield strength, and elongation were reduced 4.5%, 6.6%, and 6.0% respectively when stress relieved at 375°F for 3 hours prior to aging at 325°F for 24 hours.

4.0 RECOMMENDATIONS

None

5.0 PROCEDURES AND RESULTS

A 1/2 inch thick plate of 2219 aluminum alloy in the T37 heat treated condition was obtained. Six tensile bars of type T1 Federal Test Method 151A were machined from this plate and treated as follows:

1. 3 samples were stress relieved at $375 \pm 10^\circ\text{F}$ for 3 hours.
2. All six samples were aged at $325 \pm 10^\circ\text{F}$ for 24 hours.
3. All samples were tested in accordance with Federal Test Method 151A.

The results of these tests are shown in Table 1.

6.0 REFERENCES

Federal Test Method 151A

TABLE I
Properties of 2219 Aluminum Alloy

Solution Treated and Aged

Sample No.	Tensile Str. KSL	Yield Str. KSL	% El. in to in	Hardness HR
A-1	63.8	51.4	13.0	77
A-2	60.2	48.5	14.0	77
A-3	61.4	49.5	13.0	77
Avg.	61.8	49.8	13.3	77

Solution Treated Stress Relieved and Aged

SR 1	60.2	46.3	10.5	74
SR 2	59.3	48.8	13.0	75
SR 3	57.4	44.5	14.0	74
Avg.	59.0	46.5	12.5	74